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Indian Standard

PESTICIDES — FENTHION, TECHNICAL — SPECIFICATION

(First Revision)

भारतीय मानक

कीटनाशक — फेन्थीयन, तकनीकी — विशिष्टि

(पहला पुनरीक्षण)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1989 **Price Group** *2*

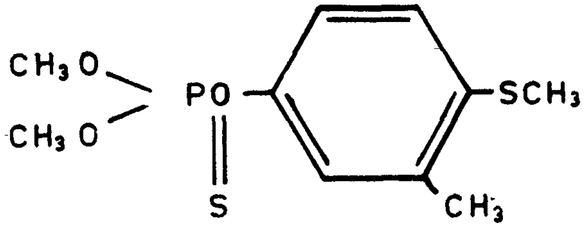
Pest Control Sectional Committee, AFCDC 6

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 24 April 1989, after the draft finalized by the Pest Control Sectional Committee had been approved by the Agricultural and Food Products Division Council.

Fenthion is an insecticide used largely for controlling pests of agricultural importance.

Fenthion is the accepted common name by the International Organization for Standardization (ISO) for 0, 0-dimethyl 0- [4-(methylthio)-*m*-tolyl] phosphorothioate, 0, 0-dimethyl 0-(3-methyl-4-methyl-thiophenyl) phosphorothionate. The structural and empirical formulae and the molecular mass are as indicated below:

Empirical Formula	*Structural Formula*	*Molecular Mass*
$C_{10}H_{15}O_3PS_2$		*278*

In the preparation of this standard, due consideration has been given to the provisions of the ***Insecticides Act,*** 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PESTICIDES — FENTHION, TECHNICAL — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for fenthion, technical.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
IS 1070 : 1977	Specification for water for general laboratory use (*second revision*)
IS 6940 : 1982	Methods of test for pesticides and their formulations (*first revision*)
IS 8190 (Part 2): 1988	-Requirements for packing of pesticides : Part 2 Liquid pesticides (*second revision)*
IS 10946 : 1984	Methods of sampling for technical grade pesticides

3 REQUIREMENTS

3.1 Description — The material shall be yellow or brown oily liquid, free from foreign matter or added modifying agents.

3.2 The material shall also comply with the requirements given in Table 1.

4 PACKING

4.1 The material shall be packed in accordance with the requirements given in IS 8190 (Part 2): 1988.

5 MARKING

5.1 The containers shall be securely closed and bear legibly and indelibly the following information in addition to 'the information as is necessary under the *Insecticides Act, 1968* and Rules:

a) Name of the material;

b) Name of the manufacturer;

c) Date of manufacture;

d) Batch number;

e) Nominal fenthion content, percent (m / m);

f) Net mass of contents, and

g) The minimum cautionary notice as worded in the *Insecticides Act, 1968,* and Rules.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 10946 : 1984.

7 TESTS

7.1 Tests shall be carried out as prescribed in the appropriate methods referred to in col 4 and 5 of Table 1.

7.2 **Quality of Reagents**

Unless specified otherwise, pure chemicals and distilled water [see IS 1070 : 1977] shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals tbat do not contain impurities which affect the results of analysis.

Table 1 Requirements for Fentbion, Technical

(Clauses 3.2 *and 7.1*)

Sl No.	Characteristic	Requirement	Method of Test, Ref to	
			Annex of This Standard	Cl No. of IS 6946 : 1982
(1)	(2)	(3)	(4)	(5)
i)	Fenthion content, percent by mass, *Min*	93·0	A	—
ii)	Material insoluble in acetone, percent by mass, Max	0·5	—	9
iii)	Moisture, percent by mass, *Max*	0·5	—	4.1
iv)	Acidity (as H_2SO_4), percent by mass, Max	0·4	—	11.3.2
v)	Alkalinity (as NaOH), percent by mass, Max	0·1	—	11.3.3

ANNEX A

[*Table* 1, Item (i)]

DETERMINATION OF FENTHION CONTENT

A-1 PRINCIPLE

A-1.1 Fenthion is split aminolytically by reacting with anhydrous ethylenediamine and titrated with potassium methylate. Acidic impurities are determined separately by dissolving the sample in dimethyl formamide and titrating with potassium methylate. The fenthion content is calculated from the difference between the two titrations.

A-2 REAGENTS

A-2.1 Ethylene diamine, anhydrous (distilled over powdered sodium hydroxide).

A-2.2 **Dimethyl Formamide**

A-2.3 **Standard Potassium Methylate Solution**

0·1 N. Prepared by dissolving 4 g of clean potassium metal in a mixture of 40 ml methanol, 40 ml isopropanol and 400 ml of benzene. As soon as the reaction is over, dilute to one litre with benzene. The detailed method for its preparation is given in Annex B.

A-2.4 **Azoviolet Indicator Solution**

Prepared by dissolving 1·0 g of azoviolet in 100 ml methyl alcohol.

A-2.5 **Thymol Blue Indicator Solution**

Prepared by dissolving 1·0 g of thymol blue in 100 ml methyl alcohol.

A-3 PROCEDURE

A-3.1 Standardization **of Potassium Methylate Solution**

Take 50 ml ethylenediamine in an Erlenmeyer flask and add 6 drops of azoviolet indicator solution. By means of a short bent tube, continuously pass nitrogen over the solution and titrate with potassium methylate solution till initial red colour changes to blue (not more than 1·5 ml of standard potassium methylate solution should be required. If more is consumed, the ethylenediamine should be distilled over sodium hydroxide). To the neutralized amine solution, add 0·5 g, accurately weighed, benzoic acid. Stir till the acid dissolves and quickly titrate with standard potassium methylate solution until the colour changes to blue:

$$\text{Factor } (\mathcal{N}) = \frac{m \times 1\,000}{122{\cdot}05 \times v}$$

where

m = mass, in g, of the benzoic acid; and

v = volume, in ml, of standard potassium methylate solution used (see A-2.3).

A-3.2 Determination of Acidic Impurities

Take 50 ml dimethyl formamide in an Erlenmeyer flask and add 5 drops of thymol blue indicator solution. By passing continuously nitrogen over the solution by means of a short bent tube, titrate with standard potassium methylate solution until the colour changes from yellow to blue. Weigh into this neutralized solvent sufficient quantity of the sample accurately weighed so as to contain 0·6 g of fenthion, and titrate with standard potassium methylate solution until the colour changes to green.

A-3.3 Determination of Fenthion Content

Take 50 ml of ethylenediamine in a stoppered Erlenmeyer flask and add 2 to 3 drops of azoviolet indicator solution. Pass continuously nitrogen over the solution by means of a short bent tube and titrate with standard potassium methylate solution until the colour changes from red to blue. Weigh into this neutralized solvent, sufficient quantity of the material to contain 0·6 to 0·7 g fenthion. Mix well, stopper the flask and allow to stand for 15 minutes at room temperature. Titrate under cover of nitrogen with standard potassium methylate solution until the colour changes to blue.

A-4 CALCULATION

Fenthion content, percent by mass

$$= \frac{\left(\frac{V_1}{M_2} - \frac{V_2}{M_1} \right) \times \mathcal{N} \times 278 \times 100}{-10\,000}$$

where

V_1 = volume, in ml, of standard potassium methylate solution;

V_2 = volume, in ml, of standard potassium methylate solution used in determination of acidic impurities (**see A-3.2**);

$\mathcal{N}$ = factor for standard potassium methylate solution (*see* A-3.1);

M_2 = mass, in g, of material taken for the test; and

M_1 = mass, in g, of the material taken for determining acidic impurities (see A-3.2).

ANNEX B

(*Clause* A-2.3)

PREPARATION OF POTASSIUM METHYLATE

B-l CLEANING OF POTASSIUM METAL

B-l.1 Take two 250-ml dry beakers and to each beaker, add 100 ml of dry benzene and to one beaker, add 5 ml of isopropyl alcohol. Pierce the potassium metal with a spatula and wash off the liquid paraffin by dipping it in a beaker containing only benzene. Then dip it in anotherbeaker containing benzene isopropyl alcohol mixture. The metal will start reacting with isopropyl alcohol. Transfer it back to the beaker containing benzene if it starts reacting. By judiciously controlling the rate of reaction, the metal surface can be cleaned without much difficulty. Do not allow the temperature to rise above 40°C to prevent benzene from catching fire. Usually after cleaning one lump, it is necessary to either cool the solvent mixture and add fresh 5 ml of isopropyl alcohol or take a fresh benzene-isopropyl alcohol mixture. After the crust is reacted, the metal surface becomes shining grey, and transfer it then to a tared porcelain dish containing liquid paraffin.

B-l.2 Procedure

To a one-litre round bottom flask fitted with an air condenser, add 400 ml benzene and 40 ml mixture of methyl alcohol and isopropyl alcohol (1 : 1). Cool the contents to 10°C on an ice-bath. Remove the bath and wipe the outer surface of the flask with a dry cloth. With the help of a spatula remove one piece of the metal. Wash off the paraffin by dipping it in the benzene containing beaker and add it to the solvent mixture by removing the air condenser, Second piece is added only after the first one is completely reacted. After the addition of about 2 g of metal, add another lot of 40 ml of methyl alcohol-isopropyl alcohol mixture. If necessary, cool the contents once again in ice water bath and proceed as described above.

B-2 PRECAUTIONS

B-2.1 Potassium metal is much more reactive than sodium. Hence utmost care shall be taken while handling potassium metal. The following precautions may be taken.

B-2.1.1 As potassium metal reacts vigorously with water and alcohol and as its melting point is only 63 to 64°C, working table surface will have to be clean and dry. Use of safety glasses and relevant safety precautions is a must.

B-2.1.2 All solvents used shall have moisture content less than 0·1 percent.

B-2.1.3 After cleaning the metal, transfer it immediately to a tared dish containing liquid paraffin and coat the surface with paraffin. After weighing, cut the metal into small pieces. One lump can be cut into 8 pieces. Avoid cutting it into very small pieces.

B-2.1.4 Do not try to wipe the metal piece dry with filter paper or it will catch fire.

B-2.1.5 For every 4 g of potassium metal, take 400 ml benzene, 40 ml each of methyl alcohol and isopropyl alcohol.

B-2.1.6 Standardize the potassium methylate solution in the usual manner.

B-2.1.7 All contaminated glassware is treated with isopropyl alcohol to dissolve all the metal traces and to minimize the fire hazard.

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